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VOL. 18 No. 10 March 8, 1968

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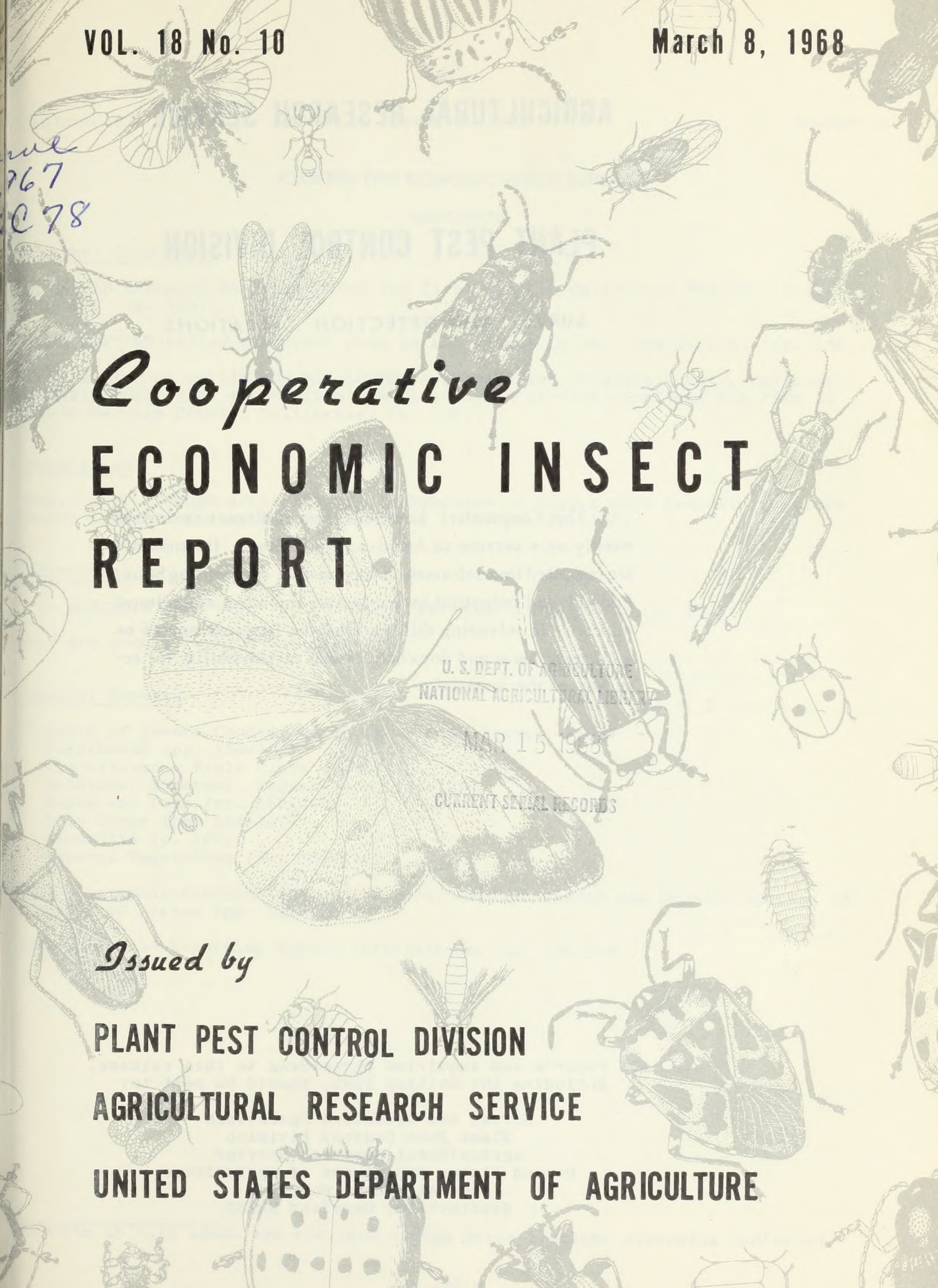

Cooperative
ECONOMIC INSECT REPORT

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PLANT PEST CONTROL DIVISION
AGRICULTURAL RESEARCH SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

PLANT PEST CONTROL DIVISION

SURVEY AND DETECTION OPERATIONS

The Cooperative Economic Insect Report is issued weekly as a service to American Agriculture. Its contents are compiled from information supplied by cooperating State, Federal, and industrial entomologists and other agricultural workers. In releasing this material the Division serves as a clearing house and does not assume responsibility for accuracy of the material.

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Volume 18 March 8, 1968 Number 10

COOPERATIVE ECONOMIC INSECT REPORT

HIGHLIGHTS

Current Conditions

A SCARAB damaging sugarbeets for the first time in California may be a potential threat. (p. 150).

BARK BEETLES killed ponderosa pine in Los Alamos County, New Mexico. (p. 152).

CATTLE LICE on cattle and HOG LOUSE on swine heavy in Mayes County, Oklahoma. PACIFIC COAST TICK responsible for first cases of tick paralysis for 1968 in Santa Barbara County, California. (p. 152).

Prediction

Heavy BEET WEBWORM adult flights in Nebraska in August 1967 indicate possible heavy larval infestations in the State in 1968. (p. 156).

Detection

Two ASSASSIN BUGS reported for the first time in Nevada. (p. 155).

For new county records see page 155.

Special Reports

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- Sugarbeets (pp. 156-157)
- Miscellaneous Field Crops (p. 157)
- Potatoes, Tomatoes, Peppers (pp. 158-162)
- Beans and Peas (pp. 162-164)
- Cole Crops (pp. 164-166)
- Cucurbits (p. 167)
- General Vegetables (pp. 168-170)

The Geographic Distribution of the Brown Recluse Spider and Related Species in the United States (pp. 171-175).

Measuring and Reporting Insect Infestations. (pp. 176-177).

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WEATHER BUREAU'S 30-DAY OUTLOOK

MARCH 1968

The Weather Bureau's 30-day outlook for March is for temperatures to average below seasonal normals over the eastern half of the Nation. Above normal temperatures are indicated west of the Divide and in western portions of the northern Plains. Elsewhere near normal temperatures are in prospect. Precipitation is expected to exceed normal in the Southeast as well as western portions of the central and southern Plains. Subnormal totals are indicated for the Midwest and the northern Mississippi Valley and also for most areas west of the Divide. Elsewhere near normal precipitation is in prospect.

Weather forecast given here is based on the official 30-day "Resume and Outlook" published twice a month by the Weather Bureau. You can subscribe through the Superintendent of Documents, Washington, D. C. 20250. Price $5.00 a year.

WEATHER OF THE WEEK ENDING MARCH 4

HIGHLIGHTS: Mild sunny weather prevailed west of the Rockies and over the northern Great Plains while generous rains fell in portions of the Deep South.

PRECIPITATION: Precipitation west of the Rocky Mountains was limited mostly to light showers over widely scattered areas. One to 6 inches of snow fell in the northern mountains of New Mexico with up to 8 inches at the higher elevations. Frontal activity early in the week produced light snow, fog, and drizzle over a wide band across the northern Great Plains and the upper Mississippi River Valley to the Appalachians.

Weather of the Week continued on page 154.

SPECIAL INSECTS OF REGIONAL SIGNIFICANCE

GREENBUG (Schizaphis graminum) - NEW MEXICO - Ranged 5-25 per linear foot in barley fields in Chaves County. (Mathews). OKLAHOMA - Counts per linear foot in wheat by county: Noble, less than 5; Johnston and Marshall, 10-15; Logan, up to 70 (average 15) on sandy soils; Jackson 125; Texas, 50-200 in irrigated wheat. Less than one percent of aphids parasitized. (Okla. Coop. Sur.). ARKANSAS - Survey negative in Washington County. (Boyer).

CORN LEAF APHID (Rhopalosiphum maidis) - NEW MEXICO - Light to moderately heavy in barley fields in Roswell area, Chaves County. (Mathews). ARIZONA - Increasing in many barley fields in Yuma, Yuma County. (Ariz. Coop. Sur.).

SPOTTED ALFALFA APHID (Therioaphis maculata) - ARIZONA - Ranged 30-80 per 100 sweeps in alfalfa in Yuma County; nymphs averaged 50 per 100 sweeps in Maricopa County. (Ariz. Coop. Sur.). NEW MEXICO - Mostly adults very light in alfalfa in northern Dona Ana County. (Nielsen).

ARMY CUTWORM (Chorizagrotis auxiliaris) - OKLAHOMA - Averaged 1 per 15 linear feet of wheat in Logan County. (Okla. Coop. Sur.).

SMALL GRAINS

WINTER GRAIN MITE (Penthaleus major) - OKLAHOMA - Ranged 5-150 per linear foot in wheat in Noble County; light in scattered fields throughout north-central area. (Okla. Coop. Sur.).

TARNISHED PLANT BUG (Lygus lineolaris) - ARKANSAS - Overwintered adults active in wheat in northwest area. (Boyer).

ENGLISH GRAIN APHID (Macrosiphum avenae) - ARKANSAS - Occasional aphid found in wheat in Washington County. (Boyer).

FORAGE LEGUMES

PEA APHID (Acyrthosiphon pisum) - MISSISSIPPI - Moderate, 20 per square foot, on Oktibbeha County alfalfa. (Dinkins). OKLAHOMA - Averaged 20 per square foot of crown area in alfalfa in Logan County. (Okla. Coop. Sur.). NEW MEXICO - Mostly light in alfalfa fields in southern counties. (N.M. Coop. Rpt.).

THREE-CORNERED ALFALFA HOPPER (Spissistilus festinus) - NEW MEXICO - Adults ranged 2-6 per 25 sweeps in northern Dona Ana County alfalfa. (Nielsen).

LYGUS BUGS (Lygus spp.) - WASHINGTON - Adults in flight at Yakima, Yakima County, February 6-28; numbers increased latter part of period. (Landis). ARIZONA - Ranged 10-60 per 100 sweeps in alfalfa from San Luis to Hyder, Yuma County. (Ariz. Coop. Sur.).

ALFALFA CATERPILLAR (Colias eurytheme) - ARIZONA - Ranged 0-120 per 100 sweeps in alfalfa in Yuma, Yuma County. (Ariz. Coop. Sur.). NEW MEXICO - Larvae 1-4 per 25 sweeps in Dona Ana County alfalfa. (Nielsen).

A NOCTUID MOTH (Dargida procincta) - CALIFORNIA - Larvae light in large alfalfa plantings in Selma, Fresno County, as early as February 8. This is first known record of winter habits for this species. (Cal. Coop. Rpt.).

GREEN JUNE BEETLE (Cotinis nitida) - MISSOURI - Larvae, 4-15+ per square foot, in established alfalfa stand in Howell County; no damage evident. (Munson).

ALFALFA WEEVIL (Hypera postica) - MISSISSIPPI - Adults per 10 square feet and eggs and larvae per 200 stems in flamed and unflamed alfalfa, respectively, in Pontotoc County: Adults 5 and 11, larvae 101 and 311, and eggs 12 and 36. (Pitre). NEVADA - Adults active in southern Washoe County. (Arnett).

EGYPTIAN ALFALFA WEEVIL (Hypera brunneipennis) - ARIZONA - Ranged 30-350 per 100 sweeps in alfalfa in Yuma County; controls applied to several fields where 50-60 percent of terminals damaged. Counts lightest at Hyder, Yuma County. (Ariz. Coop. Sur.).

WESTERN FLOWER THRIPS (Frankliniella occidentalis) - ARIZONA - Averaged 300 per 100 sweeps in most Maricopa County alfalfa. (Ariz. Coop. Sur.).

SUGARBEETS

A SCARAB (Ataenius californicus) - CALIFORNIA - Larvae damaged roots of seedling sugarbeets in September and emerging adults severely damaged foliage in October 1967 in Brawley, Imperial County. Det. by O. L. Cartwright, collected by R. Flock. This is first record of damage to sugarbeets. Species may be potential threat to sugarbeet plantings over State. (Cal. Coop. Rpt.).

SAY STINK BUG (Pitedia sayi) - ARIZONA - Adults ranged up to 10 per 100 plants in some fields near Avondale, Maricopa County; nymphs in center growth. Adult feeding punctures caused swollen areas in leaf midveins. (Ariz. Coop. Sur.).

AN EPHYDRID FLY (Psilopa leucostoma) - WASHINGTON - First adults of this new sugarbeet pest taken at Yakima, Yakima County, February 25. (Landis).

COLE CROPS

GREEN PEACH APHID (Myzus persicae) - ARIZONA - Light on commercial cabbage, Brussels sprouts, and cauliflower in Glendale area, Maricopa County. (Ariz. Coop. Sur.).

CABBAGE LOOPER (Trichoplusia ni) - FLORIDA - Very light on cabbage in Sanford area, Seminole County; cool weather prevalent. Det. by G. L. Greene. (Fla. Coop. Sur.).

GENERAL VEGETABLES

GREEN PEACH APHID (Myzus persicae) - ARIZONA - Moderate in many lettuce fields in Maricopa and Yuma Counties; controls in progress. (Ariz. Coop. Sur.).

BEET ARMYWORM (Spodoptera exigua) - ARIZONA - Few larvae found in lettuce fields at Yuma, Yuma County. (Ariz. Coop. Sur.).

CABBAGE LOOPER (Trichoplusia ni) - ARIZONA - Larvae found in lettuce at Yuma, Yuma County. (Ariz. Coop. Sur.).

DECIDUOUS FRUITS AND NUTS

PEAR PSYLLA (Psylla pyricola) - WASHINGTON - Migrating adults taken in traps on sunny days throughout winter. Trap collections about normal February 27; controls applied at Yakima, West Valley, Summitview, East Valley, and Fruitvale, Yakima County, February 28. (Landis, Hudson).

CITRUS

CITRUS RED MITE (Panonychus citri) - ARIZONA - Infestation extended to Avenue "D" west of Yuma, Yuma County; controls in progress. (Ariz. Coop. Sur.).

CITRUS THRIPS (Scirtothrips citri) - ARIZONA - Nymphs more evident at Yuma, Yuma County. (Ariz. Coop. Sur.).

OTHER TROP. & SUBTROP. FRUITS

OLIVE SCALE (Parlatoria oleae) - ARIZONA - Light in olive trees at Litchfield Park, Maricopa County. (Ariz. Coop. Sur.).

SMALL FRUITS

STRAWBERRY APHID (Chaetosiphon fragaefolii) - WASHINGTON - Aphids averaged 2 per leaf on strawberries in Vancouver, Clark County; heavier than usual for time of year. (Shanks).

ORNAMENTALS

ARMORED SCALES - FLORIDA - All stages of Diaspis boisduvalii severe on 250 of 500 orchids in greenhouse at Zellwood, Orange County, February 19. (Musgrove). Entire orchid nursery at Lakeland, Polk County, placed under restrictions when all stages of D. boisduvalii found severe on 80 percent of 4,684 orchids February 20. (McLeod, Stall). Few Phenacaspis cockerelli taken on bird-of-paradise at DeLand, Volusia County (Roberts); severe on southern magnolia trees at Zellwood February 22 (Musgrove). Infested 350 of 500 southern magnolia nursery plants at Lake Monroe, Seminole County; 500 of 1,000 Roebelen date palm, Phoenix humilis loureiri, nursery plants, and 320 of 400 Butia capitata at Lake Monroe February 23, and 120 of 150 Mediterraneanpalm, Chamaerops humilis, plants at Oviedo, Seminole County, February 21. (Kipp). Pseudaulacaspis pentagona moderate to severe on 1,010 California privet (Ligustrum ovalifolium), orchid-tree (Bauhinia sp.), and sweet olive (Osmanthus fragrans) nursery plants at Dover, Hillsborough County, February 21. (Simmons).

A PIT SCALE (Cerococcus deklei) - FLORIDA - Adults severe on 342-384 of 427 hibiscus plants at nursery in Miami, Dade County, February 23. (Cervone).

MEALYBUGS - FLORIDA - All stages of Geococcus coffeae severe on 1,000 of 2,000 Nephthytis sp. (emerald gem) plants at nursery in Apopka, Orange County, February 19. All stages of Pseudococcus adonidum severe on all 100 orchid plants, Oncidium sp., in greenhouse at Zellwood February 19. (Musgrove).

PEA APHID (Acyrthosiphon pisum) - ARIZONA - Heavy on untreated snapdragon plantings in west Phoenix area, Maricopa County. (Ariz. Coop. Sur.).

APHIDS (Aphis spp.) - ALABAMA - A. spiraecola eggs hatching on spirea plants in central and southern areas throughout winter; adults not abundant. Nymphs increased to 10-25 per branch tip in Lee County due to higher temperatures and more sunlight hours. (McQueen). ARIZONA - A. spiraecola heavy on young tip growth of many pyracantha plantings in Phoenix area, Maricopa County. A. nerii heavy on oleander terminals in Yuma, Yuma County. (Ariz. Coop. Sur.).

PALM LEAF SKELETONIZER (Homaledra sabalella) - FLORIDA - Larvae, pupae, and adults active on palms in Tampa, Hillsborough County, February 20. (Patton).

FOREST AND SHADE TREES

BARK BEETLES - NEW MEXICO - Ips spp. killing ponderosa pines at Los Alamos, Los Alamos County. (Heninger). MARYLAND - Dendroctonus frontalis killed isolated loblolly pines in Worcester and Somerset Counties. (U. Md., Ent. Dept.).

EASTERN TENT CATERPILLAR (Malacosoma americanum) - ALABAMA - Egg clusters light, 0-3 per tree, on isolated cherry trees in Lee County; no hatch to date. Some egg masses partially destroyed, probably by birds. (McQueen).

WHITE-PINE APHID (Cinara strobi) - MARYLAND - Eggs heavy on white pine needles at Bel Air, Harford County. (U. Md., Ent. Dept.).

MAN AND ANIMALS

SCREW-WORM (Cochliomyia hominivorax) - No cases reported in U.S. February 25 to March 2, 1968. Total of 60 cases reported in portion of Barrier Zone in Republic of Mexico as follows: Territorio sur de Baja California 7, Sonora 7, Chihuahua 2, Coahuila 3, Tamaulipas 41. Total of 2 cases reported in Mexico south of Barrier Zone. Barrier Zone is area where eradication operations underway to prevent establishment of self-sustaining population in U.S. Sterile screw-worm flies released: Texas 168,000, Mexico 108,736,000. (Anim. Health Div.).

COMMON CATTLE GRUB (Hypoderma lineatum) - OKLAHOMA - Averaged 1 per head on two-year-old Payne County cattle and moderate on Mayes County cattle. (Okla. Coop. Sur.).

SHEEP KED (Melophagus ovinus) - UTAH - Numerous on sheep in Box Elder County; some treatments planned this spring. (Allred).

CATTLE LICE - UTAH - Total of 40 percent of beef cattle treated in Millard County. (Hall, Knowlton). OKLAHOMA - Haematopinus eurysternus and Linognathus vituli averaged 5 per 10 parts on cattle in Payne and Creek Counties; heavy on cattle in Mayes County and light to medium in Johnston and Marshall Counties. (Okla. Coop. Sur.).

HOG LOUSE (Haematopinus suis) - OKLAHOMA - Heavy on swine in Mayes County and light on treated hogs in Johnston County. (Okla. Coop. Sur.).

HARD-BACKED TICKS (Dermacentor spp.) - CALIFORNIA - D. occidentalis infested cattle and horses in Lompoc, Santa Barbara County; 20 cattle and one horse infested on ranch. Three steers and one horse paralyzed on this ranch but recovered 2-3 hours after treatment. This is first report of tick paralysis in 1968. Collected by W. Marshall. Det. by R. Annereaux, confirmed by C. B. Phillips. (Cal. Coop. Rpt.). NEVADA - D. albipictus adults and nymphs light on deer in Ruby Mountains and Spruce Mountain area, Elko County, and in Cherry Creek area of White Pine County. (Nev. Fish & Game).

BROWN RECLUSE SPIDER (Loxosceles reclusa) - ALABAMA - Specimen taken from home in Fayette County. (Arant, Cunningham). Numerous specimens previously collected in Fayette County. (Pitts).

HOUSEHOLDS AND STRUCTURES

A COCKROACH (Blattella vaga) - ARIZONA - General in most dark storage areas under dead, matted Bermuda grass and weeds along alley fence lines. Annoying homeowners by entering homes around improperly sealed windows and doors in Phoenix area, Maricopa County; many yards sprayed. (Ariz. Coop. Sur.).

A WEEVIL (Trachyphloeus bifoveolatus) - WASHINGTON - Heavy and annoying in houses in Bellingham, Whatcom County, for a new county record. (Soo Hoo, Johansen). Annoying at Vancouver, Clark County. (Retan).

BROWN SPIDER BEETLE (Ptinus clavipes) - IOWA - Adults emerging from walls in home in Benton County. This is a new county record. (Gunderson).

MISCELLANEOUS WILD PLANTS

A NOCTUID MOTH (Emboloecia sauzalitae) - CALIFORNIA - Larvae on stems and adults on foliage of tansy ragwort, Senecio jacobaea, in Fort Bragg, Mendocino County. This species has a wide host range of cultivated plants. Tansy ragwort is under biological control with a cinnabar moth, Tyria jacobaeae. (Hawks).

STORED PRODUCTS

AN ACARID MITE (Tyrophagus longior) - CALIFORNIA - Light to heavy in milk cartons in retail market in Modesto, Stanislaus County. (Cal. Coop. Rpt.).

BENEFICIAL INSECTS

LADY BEETLES - ARIZONA - Averaged 10 per 100 sweeps in Maricopa County alfalfa; moderate in Yuma County barley. (Ariz. Coop. Sur.). OKLAHOMA - Hippodamia convergens active in wheat in Noble, Logan, and Texas Counties. (Okla. Coop. Sur.).

GREEN LACEWINGS (Chrysopa spp.) - ARIZONA - Nymphs averaged 20 per 100 sweeps in most alfalfa in Maricopa County. (Ariz. Coop. Sur.).

BIG-EYED BUGS (Geocoris spp.) - ARIZONA - Averaged 2 per plant in sugarbeet fields in Tolleson, Maricopa County. (Ariz. Coop. Sur.).

A STINK BUG (Brochymena sulcata) - WASHINGTON - Adults active in recent warm weather in home orchards at Wenatchee, Chelan County. (Lange, Retan).

FEDERAL AND STATE PLANT PROTECTION PROGRAMS

CARIBBEAN FRUIT FLY (Anastrepha suspensa) - FLORIDA - Larvae taken from sour orange at location in Ft. Lauderdale, Broward County, February 23. (Clinton). Adult emergence February 20 from fruits of satinleaf starapple, Chrysophyllum oliviforme, in Dade County January 10. (Knowles, Swanson). This is a new host record. (Fla. Coop. Sur.). Moderately heavy during January; very heavy increases expected with warmer weather. (PPC South. Reg.).

CITRUS BLACKFLY (Aleurocanthus woglumi) - MEXICO - Total of 385 trees found infested on 4 previously infested properties northeast of Linares, Nuevo Leon; inspections on 31,931 trees on 752 properties in Tamaulipas and Nuevo Leon. Total of 3,612 trees on 4 properties given first application and 3,968 trees on 522 properties given second application at Linares. (PPC Mex. Reg., Jan. Rpt.).

IMPORTED FIRE ANT (*Solenopsis saevissima richteri*) - GEORGIA - Extensions found in Brantley, Bulloch, Ware, Wayne, Cook, and Lowndes Counties during January. ALABAMA - Extensions found in 9 of 18 counties inspected; mound treatments applied to 516 acres in 8 counties. MISSISSIPPI - Extensions found in Sharkey, Warren, and Yazoo Counties of the 20 counties inspected; mound treatments continued in Covington, Jefferson Davis, and Pike Counties. (PPC South. Reg.).

MEXICAN FRUIT FLY (*Anastrepha ludens*) - TEXAS - First adult, a nongravid female, of season trapped in 20-acre citrus grove near Harlingen, Cameron County, January 22; 2,400 trap inspections made in 13 counties. (PPC South. Reg.).

PINK BOLLWORM (*Pectinophora gossypiella*) - OKLAHOMA - Decreased to 8 larvae per inspection in lint cleaners in Caddo, Comanche, McClain, and Stephens Counties in January. (PPC South. Reg.). NEW MEXICO - Larvae ranged 0-270 per inspection in 20 of 27 lint cleaner inspections in Dona Ana County in January. CALIFORNIA - Total of 222,000 of 225,000 acres of cotton in 5 counties received some form of cultural control. Stalk destruction now complete in Riverside, San Bernardino, San Diego, and Imperial Counties; 98 percent complete in Kern County. NEVADA - Stalk destruction about 90 percent complete. (PPC West. Reg.).

SWEETPOTATO WEEVIL (*Cylas formicarius elegantulus*) - ALABAMA - Found for the first time in Barbour County. (PPC South. Reg., Jan. Rpt.).

LIGHT TRAP COLLECTIONS

FLORIDA - Gainesville - 2/27, BL - Armyworm (*Pseudaletia unipuncta*) 1. Monticello-2/22-28, 2BL - Armyworm 119, black cutworm (*Agrotis ipsilon*) 10. Sanford - 2/23, BL - Armyworm 13, black cutworm 5, granulate cutworm (*Feltia subterranea*) 17. TEXAS - Brownsville - 2/24-3/1, 2BL, 32-79°F., no precip. - Armyworm 35, black cutworm 157, granulate cutworm 25, salt-marsh caterpillar (*Estigmene acrea*) 13, tobacco budworm (*Heliothis virescens*) 1, variegated cutworm (*Peridroma saucia*) 21, yellow-striped armyworm (*Prodenia ornithogalli*) 5.

CORRECTIONS

CEIR 18(8):96 - INSECT DETECTION - New County Records - GLOVER ROOT BORER (Hylastinus obscurus) should read CLOVER ROOT BORER.

CEIR 18(8):109 - Paragraph 2, lines 11 and 12 -...A CUTWORM (Feltia ducens)... should read *DINGY CUTWORM* (*Feltia subgothica*).

Weather continued from page 148.

At midweek, thunderstorms occurred over the southern Great Plains. Northeastern and east-central Arkansas received 2 to 4 inches of snow on Wednesday and up to 7 inches fell in parts of the southern Appalachians on Wednesday night and Thursday forenoon. As the storm moved northward along the Atlantic coast, it produced snow or rain in much of the Northeast. The eastern Panhandle of West Virginia received 5 inches of snow on March 1 following the driest February of record. Trenton, New Jersey, received 0.60 inch of rain on February 29. Trenton had received only 0.55 inch in the previous 28 days. Had this not been Leap Year, this would have been the driest February of record at Trenton.

TEMPERATURE: Warm weather has prevailed from the Pacific Ocean to the Rocky Mountains through the entire month of February. Portland, Oregon, registered 75° on Thursday, February 29, setting a new February record high temperature. Most of Nevada averaged 8° to 10° warmer than normal last week and Montana averaged 12° to 19° warmer than normal. Mild temperatures were general over the northern Great Plains following 2 weeks of cool weather. Temperatures over the central and southern Great Plains remained below normal, continuing the trend that has prevailed since late in January. Most of the area east of the Mississippi River and south of the Ohio averaged 9° to 12° cooler than normal. (Summary supplied by Environmental Data Service, ESSA.)

HAWAII INSECT REPORT

Turf, Pasture, Rangeland - Larvae and adults of a GRASS WEBWORM (*Herpetogramma licarsisalis*) generally light; increasing and spreading since first discovery February 5 at Wailua, Kauai. Ranged 3-5 per square foot in some lawns in Wailua and Lihue; webbing conspicuous. Adults common on walls and ceilings of buildings, especially near lights at night in Kapaa, Wailua, Lihue, and Koloa, Kauai. Larvae and adults decreasing in Kaneohe, Wahiawa, and Pearl City, but medium to heavy in scattered areas in Honolulu and Kailua, Oahu. Numerous eggs parasitized by a MINUTE EGG PARASITE (*Trichogramma semifumatum*) in many areas. (Sugawa et al.). Larvae of a BILLBUG (*Sphenophorus venatus vestitus*) caused moderate damage to Kikuyu grass pastures in Kipahulu, Maui. (Miyahira).

General Vegetables - CARMINE SPIDER MITE (*Tetranychus telarius*) and LEAF MINER FLIES (*Liriomyza* spp.) very light on snap and yard-long beans in Waimanalo, Oahu; population buildup expected with warmer weather. (Kubota, Ishiki). GREENHOUSE WHITEFLY (*Trialeurodes vaporariorum*) increase began in most snap bean fields in Waimanalo, Oahu. Adults light to moderate and eggs ranged 10-125 per leaf; some eggs hatching. (Funasaki). TARO LEAFHOPPER (*Tarophagus proserpina*) controlled, especially by a PREDACIOUS CAPSID BUG (*Cyrtorhinus fulvus*), in most taro fields on Oahu, Kauai, and Maui. Adults ranged 0-5 per leaf-stem in Kahaluu, Oahu; 0-2 per leaf-stem in Hanapepe, Kauai, and in Keanae and Waihee, Maui. Nymphs and adults averaged 100+ per leaf-stem in small, new planting in Waikapu, Maui. (Miyahira et al.).

Forest and Shade Trees - ACACIA PSYLLID (*Psylla uncatoides*) remains very light, 5 per 5 sweeps, on koa trees in Honolulu, Kaneohe, and Waimanalo, Oahu; moderate, 30 per 5 sweeps, on koa trees at Kokee State Park and Kukuiolono Park in Kalaheo, Kauai. (Funasaki).

Miscellaneous Insects - VAGRANT GRASSHOPPER (*Schistocerca vaga*) continues buildup on Sand Island, Oahu; numerous adults flushed from weeds. (Wong, Otsuka). Survey for additional specimens of a LONGHORN GRASSHOPPER (*Euconocephalus nasutus*) in Waipahu, Oahu, negative to date. (Otsuka, Higa).

INSECT DETECTION

New State Records

AN ASSASSIN BUG (*Reduvius vanduzeei*) - NEVADA - Male taken in light trap at Logandale, Clark County, August 10, 1959, by R. C. Bechtel. Det. by P. W. Wygodzinsky.

AN ASSASSIN BUG (*Reduvius sonoraensis*) - NEVADA - Two males taken in light trap at Bunkerville, Clark County, May 6, 1962, by R. C. Bechtel. Det. by P. W. Wygodzinsky.

New County Records

BILLBUGS - NEVADA - *Sphenophorus aequalis ochreus* and *S. graminis* in Pershing County; *S. gentilis* in Eureka and Humboldt Counties; *S. phoeniciensis* in Nye County.

A WEEVIL (*Trachyphloeus bifoveolatus*) - WASHINGTON - Whatcom County. (p. 153).

BROWN SPIDER BEETLE (*Ptinus clavipes*) - IOWA - Benton County. (p. 153)

SWEETPOTATO WEEVIL (*Cylas formicarius elegantulus*) - ALABAMA - Barbour County. (p. 154).

SUMMARY OF INSECT CONDITIONS IN THE UNITED STATES - 1967

(continued from page 145)

SUGARBEETS

Highlights:

BEET WEBWORM adult flights were the highest recorded for August in recent years in Nebraska. WESTERN YELLOW-STRIPED ARMYWORM was heavier in 1967 than in many years in California. SUGAR-BEET ROOT MAGGOT adults were the heaviest in recent years in Weld and Larimer Counties, Colorado. SUGAR-BEET ROOT APHID was unusually heavy in the Appleton area of Minnesota. TARNISHED PLANT BUG was heavy and damaging to sugarbeets throughout New York.

BEET WEBWORM (Loxostege sticticalis) adult flights in August were the heaviest recorded in recent years in NEBRASKA. Heavy larval infestations are possible in 1968. Flights peaked on June 28 in eastern NORTH DAKOTA. Low larval populations caused no damage. In MONTANA beet webworm infested 3-4 thousand acres in Yellowstone, Carbon, Big Horn, and Richland Counties. Moth flights were below normal and larval injury was very light in UTAH. This pest was a local problem in San Joaquin County, CALIFORNIA. GARDEN WEBWORM (L. similalis) adults in WASHINGTON were first observed in April in Yakima County.

CUTWORMS damaged new sugarbeets throughout 1967 in CALIFORNIA and caused spotted damage to stands in the spring in UTAH. The most serious damage occurred in the Carbon and Emery County area. Unspecified CUTWORMS damaged some sugarbeets in NEW YORK but were not serious overall. VARIEGATED CUTWORM (Peridroma saucia) damaged some sugarbeets in the panhandle area of NEBRASKA from late May into June. WESTERN YELLOW-STRIPED ARMYWORM (Prodenia praefica) was heavier in 1967 than in many years in CALIFORNIA and BEET ARMYWORM (Spodoptera exigua) was damaging at many locations in the State. Beet armyworm was light to moderate from January through mid-April in Maricopa and Pinal Counties, ARIZONA, with damage heavy in some fields in Maricopa County during December. SALT-MARSH CATERPILLAR (Estigmene acrea) larval migrations were heavy in Maricopa County, ARIZONA, and aluminum barriers were required in many fields during November.

SPINACH LEAF MINER (Pegomya hyoscyami) injury was common but normal in UTAH. In COLORADO, foliage damage began early in the season and continued through harvest. Spinach leaf miner was noneconomic in a few fields along the Yellowstone River in MONTANA. Populations were very troublesome on sugarbeets in most areas of MAINE as both commercial and home growers were affected. BEET LEAF MINER (P. betae) infestations ranged 6-70 and averaged 39 percent in Pembina and Walsh Counties, NORTH DAKOTA. In MINNESOTA beet leaf miner eggs and larvae were light in Kittson and Marshall Counties in June and were only found in early plantings.

SUGAR-BEET ROOT MAGGOT (Tetanops myopaeformis) adults in COLORADO were the heaviest in recent years in Weld and Larimer Counties. Losses ranged moderate to heavy. In IDAHO adults began to emerge on May 17 over a wide area of Rupert and Paul in Minidoka County, and by June 18 damage and some dying beets were apparent. During the oviposition period potential populations were severely limited by cold, wet weather. Plant stands were reduced an average of 6.8 percent in several check plots under chemical control experiments in the Rupert and Paul areas. Sugar-beet root maggot infested sugarbeets at many locations in MONTANA but was damaging only in a few instances. This pest was not as serious as in some years. Adult emergence began in NORTH DAKOTA June 12-18 and numbers peaked June 19-25. Larvae appeared in the fields July 10-16. Infestations reached 90 percent in some untreated fields in Walsh and Pembina Counties.

FLEA BEETLE injury was below normal and moderate on young sugarbeets in UTAH. In COLORADO larvae of Epitrix sp. and Systena sp. damaged germinating seeds and seedlings. Some fields were replanted or abandoned. PALE-STRIPED FLEA BEETLE (*S. blanda*) destroyed several sugarbeet plantings and TEN-LINED JUNE BEETLE (*Polyphylla decemlineata*) heavily damaged plantings on former pastureland in the NEBRASKA Panhandle.

SUGAR-BEET WIREWORM (*Limonius californicus*) destroyed a sugarbeet field at Sand Hollow, IDAHO, and severely damaged sugarbeets in parts of Yakima County, WASHINGTON.

GREEN PEACH APHID (*Myzus persicae*) nymphs were reported on sugarbeets in May in Yakima County, WASHINGTON, and very early populations were heavy in Walla Walla County. Green peach aphid was probably the dominant aphid on sugarbeets in CALIFORNIA. In general aphids were serious pests of this crop. In ARIZONA controls were required during the summer. Populations were light to heavy from January to March in Pinal and Maricopa Counties. During November and December numbers were moderate to heavy in Maricopa County. Green peach aphid was generally moderate in UTAH and was one of the common aphids on sugarbeets in NEW YORK.

SUGAR-BEET ROOT APHID (*Pemphigus populivenae*) was unusually heavy in the Appleton area of MINNESOTA as the dry season favored development. Infestations were spotty throughout the fields where heavily infested sugarbeets wilted or died. Syrphid fly larvae were heavy in the area.

SOUTHERN GARDEN LEAFHOPPER (*Empoasca solana*) was moderate to heavy in sugarbeets during early January in Maricopa and Pinal Counties, ARIZONA. Females of a PIT SCALE (*Asterolecanium arabidis*) were collected on sugarbeet leaf stalks and weeds from June through August in Yakima County, WASHINGTON. This was the first record for the eastern part of the State.

LYGUS BUGS (*Lygus* spp.) were often damaging along the Yellowstone River in MONTANA where controls were necessary. Mainly TARNISHED PLANT BUG (*L. lineolaris*) was heavy and damaging to sugarbeets throughout NEW YORK.

MISCELLANEOUS FIELD CROPS

LYGUS BUGS (*Lygus* spp.) caused much damage to safflower in CALIFORNIA and are increasing in importance on this crop in the State. In ARIZONA lygus bug nymphs and adults were generally heavy on safflower from March through mid-July in Maricopa and Pinal Counties and were heavy during June and July in Yuma County. Adults were heavy in early December in Maricopa County. GREEN PEACH APHID (*Myzus persicae*) was moderate to heavy on safflower in the first half of March in Maricopa and Yuma Counties, Arizona.

BLACK VINE WEEVIL (*Brachyrhinus sulcatus*) larvae killed some hop crowns in Yakima County, WASHINGTON. Most adults had emerged by June 2. PACIFIC COAST WIREWORM (*Limonius canus*) damaged mint in the same county.

BANDED SUNFLOWER MOTH (*Phalonia hospes*) and SUNFLOWER MOTH (*Homoeosoma electellum*) populations decreased in commercial sunflower fields in eastern NORTH DAKOTA compared with 1966. Larvae averaged 2 per head with an average of 28 percent of the heads infested. Sunflower moth larvae comprised one percent of the population.

POTATOES, TOMATOES, PEPPERS

Highlights:

COLORADO POTATO BEETLE populations were the heaviest in several years in Maine but controls reduced damage below the existing potential. Populations were heavy throughout the season in New Jersey and damaged tomatoes late in the season. Colorado potato beetle damaged potatoes and tomatoes on the Eastern Shore of Maryland and populations were heavier than during 1966 in Virginia. FLEA BEETLES and WIREWORMS caused some damage in several areas. CUTWORMS were damaging in Utah and Florida, but BLACK CUTWORM caused less damage to potatoes in 1967 in New Jersey and Rhode Island. VARIEGATED CUTWORM also caused less damage to potatoes in New Jersey. TOMATO FRUITWORM was the most important pest of tomatoes in Alabama in 1967 while GREEN PEACH APHID was the most abundant aphid on potatoes in Utah. POTATO APHID seriously damaged tomatoes in Bowie and Upshur Counties, Texas, and was a major pest on potatoes in other areas. SLUGS destroyed thousands of dollars of ripe tomatoes in Pennsylvania.

COLORADO POTATO BEETLE (Leptinotarsa decemlineata) populations were heavy early in RHODE ISLAND. They were controlled in most commercial plantings. Moderate to heavy populations damaged potatoes at several locations in central and southern MAINE. Populations reached outbreak proportions in some areas by mid-July with infestations at highest levels in several years. Control measures held damage below the existing potential. Populations in Aroostook County remained at low levels throughout the season; only in the Lee and Houlton areas did substantial damage occur. In NEW YORK a very low number infested potatoes throughout the season on Long Island. Populations have increased markedly in the past few years in eastern PENNSYLVANIA. Although numbers were still moderately low, larvae required special control measures in approximately 1,000 acres of potatoes. In NEW JERSEY extremely heavy populations damaged untreated vines early in the season. Heavy numbers continued to infest potatoes, tomatoes, and eggplants throughout the season. Late season infestations on tomatoes were particularly injurious. In DELAWARE numbers were heavy in some commercial plantings of tomatoes and potatoes. Colorado potato beetle damaged potatoes and tomatoes at many locations on the Eastern Shore of MARYLAND. Above normal numbers of the second generation injured late potatoes and eggplants over most of the State.

Colorado potato beetle in VIRGINIA was slightly greater in 1967 than in 1966 but was below the peak levels of 1962-1965. Large numbers of convergent lady beetle fed on egg masses and larvae in April and May on the Virginia Eastern Shore. This leaf beetle was a definite problem in FLORIDA where controls were not applied. It was generally distributed in the tomato transplant growing areas of Alachua, Putnam, and Marion Counties. The constant use of pesticides kept Colorado potato beetle under control in the commercial growing areas of ALABAMA. It became active in gardens in central, north-central, and east-central OKLAHOMA in early April. By late April and early May numbers ranged moderate to heavy. Populations were heavy on potatoes in Dickinson County, KANSAS, in late June. In NORTH DAKOTA 12 larvae per 100 sweeps infested untreated potato fields in Walsh County. A limited outbreak of Colorado potato beetle occurred on some potatoes in Weber, Davis, and Cache Counties, UTAH. All stages infested potatoes in Deschutes, Jefferson, and Crook Counties, OREGON, during July. Controls were necessary in some fields. This pest appeared in Yakima County, WASHINGTON, in May.

POTATO FLEA BEETLE (Epitrix cucumeris) infestations and damage were moderate on potatoes in central MAINE, but numbers and damage from overwintered beetles were light near Presque Isle. Numbers appeared heavier in the Lee and Houlton areas of Aroostook County. Populations and damage ranged light to moderate on tomatoes in several areas. Damage on new tomato foliage in commercial plants in Westbrook and Scarboro in late June indicated substantial migration into a previously treated field. Potato flea beetle was of minor importance in commercial plantings in RHODE ISLAND. Injury in NEW JERSEY was considerably less in 1967 than in 1966. Potatoes were injured much less in 1967 than in previous years in DELAWARE. Control measures kept numbers low in most potato-growing areas of NORTH DAKOTA.

TOBACCO FLEA BEETLE (*Epitrix hirtipennis*) was primarily a pest of seedlings and transplants in CALIFORNIA. It was more severe in 1967 than before. In OREGON TUBER FLEA BEETLE (*E. tuberis*) lightly infested garden potatoes in Jackson County but did not infest potatoes in Klamath, Deschutes, Jefferson, Crook, and Malheur Counties. Surveys did not reveal any WESTERN POTATO FLEA BEETLE (*E. subcrinita*) in the usually infested fields in July in central Oregon and Klamath County. FLEA BEETLES (*Epitrix* spp.) adults were a problem on young potatoes, tomatoes, and peppers in all of MARYLAND.

GREAT BASIN WIREWORM (*Ctenicera pruinina*) was severe in spots on potatoes in Walla Walla County, WASHINGTON. Totaling 100 acres, this field had been treated in 1966. In Grant County PACIFIC COAST WIREWORM (*Limonius canus*) damaged potatoes. In Washington County, IDAHO, SUGAR-BEET WIREWORM (*L. californicus*) infested a 300-acre potato field. This field was planted to wheat earlier in 1967. Hill samples in June indicated a spotty population of 1.24 larvae per hill. Seed pieces in a potato field near Blackfoot were generally infested with larvae on June 9. SOUTHERN POTATO WIREWORM (*Conoderus falli*) injury ranged very low to negligible on potatoes observed during grading at Hastings, St. Johns County, FLORIDA.

VEGETABLE WEEVIL (*Listroderes costirostris obliquus*) adults caused economic damage to potatoes in Santa Rosa County, FLORIDA, during middle and late March. It fed on the leaves and covered many plants at Ponce de Leon, Holmes County. Vegetable weevil damaged tomato plants in southeastern ARKANSAS in late April. PEPPER WEEVIL (*Anthonomus eugenii*) damaged peppers, particularly chili peppers, in southern CALIFORNIA.

Various beetles were troublesome. DARKLING BEETLES (*Metoponium* sp. and *Blapstinus* sp.) caused much damage to young tomato fields in CALIFORNIA. Adult MAY BEETLES (*Phyllophaga* spp.) began appearing by May 12 in blacklight traps in WISCONSIN. The flight peaked in mid-June and decreased gradually. Numerous instances of grub damage occurred to garden potatoes.

TOMATO FRUITWORM (*Heliothis zea*) damaged tomatoes a great deal throughout CALIFORNIA. Injury in UTAH was very light on tomatoes. This pest caused little concern in KANSAS and infested tomatoes in OKLAHOMA. In ARKANSAS regular treatments on tomatoes held damage to low levels. In ALABAMA, although it was the most important pest of tomatoes throughout the season in gardens and commercial plantings, it was not nearly as serious as in 1966. Although not numerous in VIRGINIA early in the season, tomato fruitworm damaged many late tomatoes. In NEW JERSEY populations ranged moderate to heavy late in the season on tomatoes. CABBAGE LOOPER (*Trichoplusia ni*) and larvae of a NOCTUID MOTH were quite severe at times on commercial tomatoes at the Immokalee area of the Everglades, FLORIDA. Weather conditions combined with a natural control agent virtually eliminated it on the Eastern Shore of VIRGINIA. In late July and early August heavy populations developed on tomatoes. A widespread epidemic of nuclear polyhedrosis virus also developed. By September 10 an uninfected larva was rare. Virus dissemination was so thorough that larvae never became a problem again. In DELAWARE large numbers of cabbage looper fed on tomato foliage in commercial plantings. In NEVADA infestations required controls on potatoes in Lyon County in July. Cabbage looper was locally damaging on some tomato plantings in CALIFORNIA.

ALFALFA LOOPER (*Autographa californica*) moths were trapped from May 27 onward and larvae infested potatoes in Franklin County, WASHINGTON. WESTERN YELLOW-STRIPED ARMYWORM (*Prodenia praefica*) caused much damage to potato foliage in

Klamath County, OREGON, during August and September. BEET ARMYWORM (Spodoptera exigua) damaged some tomato plantings in CALIFORNIA. GRANULATE CUTWORM (Feltia subterranea) was one of the 3 dominant cutworms which damaged young field-set tomatoes in California.

In UTAH unspecified CUTWORMS caused occasional injury to young potatoes in scattered localities and damaged tomatoes at Blanding, San Juan County. STALK BORER (Papaipema nebris) infested tomatoes in OKLAHOMA. Cutworms damaged potatoes at Hastings, FLORIDA. Cutworm and tuberworm damage ran as high as 15 percent in some lots. Controls were not applied because of a freeze on February 25-27 which caused a large loss. A CUTWORM (Prodenia sp.) bored into peppers, but numbers were heavier on spiny amaranth in the Belle Glade area of Florida. BLACK CUTWORM (Agrotis ipsilon) damaged newly set tomatoes on the Eastern Shore and injured more than the usual amount of potato tubers on the lower Eastern Shore of MARYLAND. In NEW JERSEY potato injury was much less in 1967 than in 1966. Moth flights were generally abundant during the summer. The wet season provided hosts other than vegetables. Potato injury in RHODE ISLAND was less than in the preceding 2 years. Damage by this cutworm was important in most years but was not so in 1967 on Long Island, NEW YORK. In WISCONSIN black cutworm moths began appearing in blacklight traps in late April and larvae caused light damage to potatoes and tomatoes by late May in Sauk County. No significant damage was noted elsewhere in subsequent surveys. Black cutworm was one of the 3 dominant cutworms which damaged young field-set tomatoes in CALIFORNIA. VARIEGATED CUTWORM (Peridroma saucia) moderately damaged potatoes in some localities of Franklin County in WASHINGTON. No infestations of importance occurred in OREGON in 1967. Variegated cutworm was 1 of 3 dominant cutworms which damaged young field-set tomatoes in CALIFORNIA. In NEW JERSEY injury to potatoes in 1967 was significantly less than in 1966. Moth flights were generally abundant during the summer. The wet season provided hosts other than vegetables.

POTATO TUBERWORM (Phthorimaea operculella), favored by warm weather, caused increasing damage as the season progressed in FLORIDA. At Hastings, harvested tubers averaged approximately 5 percent injury. Larvae infested about 5 percent of 100,000 eggplants in Lake County during April; eggplants had to be sprayed weekly at Hastings, St. Johns County, to prevent injury. Isolated potato growers in Baldwin County, ALABAMA, had one of the worst infestations on record. It reinfested isolated fields in Mobile and seriously affected a large planting in Escambia County. Potato tuberworm occurred in only trace numbers in some Washington County, UTAH, potatoes. It was probably less of a problem than other years in CALIFORNIA. Small populations of TOMATO PINWORM (Keiferia lycopersicella) occurred late in California.

EUROPEAN CORN BORER (Ostrinia nubilalis) first generation in NEW JERSEY was moderate on potatoes. In DELAWARE numbers were heavy in some potato plantings in Kent County but were very light on sweet peppers in late September and early October. Populations of both broods were much larger than experienced in many years in PENNSYLVANIA and damaged some peppers and tomatoes. On the Eastern Shore of VIRGINIA, European corn borer did not reach the high levels anticipated from the number which entered hibernation. Cold, wet weather in late April and May, and high winds and frost may have killed many adults or prevented mating. Also, very large numbers of convergent lady beetle fed on egg masses. In most potato fields European corn borer caused light damage to the spring crop. About 10-14 days behind schedule, they developed too late to appreciably affect yield. As many as 10 borers per hill infested all of the fall crop at Painter. Very light numbers infested pimiento peppers in the commercial growing area of northern ALABAMA. It did not affect production or sales. Some injury to peppers and potatoes occurred in certain areas of MICHIGAN. In NEBRASKA European corn borer was present in stems of 10-15 percent of the potato plants checked in Lancaster County on July 15.

HORNWORMS (Manduca spp.) caused minor damage to tomatoes where prompt control was not applied in Bernalillo, Sandoval, Dona Ana, and Luna Counties in NEW MEXICO.

GREEN PEACH APHID (*Myzus persicae*) was a slight problem in scattered locations of Long Island, NEW YORK. Populations throughout NEW JERSEY were generally less abundant in 1967 than in recent years. Populations were moderate on potatoes, peppers, and eggplants and generally light on tomatoes. Systemic insecticides kept numbers on potatoes in DELAWARE very low until late in the season. Infestations were much lower than in previous years on sweet peppers. Numbers were locally injurious on potatoes and tomatoes over most of MARYLAND. During August medium to heavy populations infested peppers in Wicomico and Worcester Counties. The light to moderate green peach aphid populations which developed at Hastings, St. Johns County, FLORIDA, were not considered a problem. However, this aphid was a problem from Pompano Beach southward. Numbers were perhaps heavier on potatoes, except where controls were applied. Green peach aphid was a problem in commercial chili fields and home gardens in Dona Ana County, NEW MEXICO, during July. Adequate control was difficult. Populations ranged from light to moderate in the potato-growing area of COLORADO. In UTAH it was the most abundant aphid on potatoes and was moderate on tomatoes. Green peach aphid was one of the 3 most prevalent species in CALIFORNIA. In general aphids were prevalent on all solanums in the State.

POTATO APHID (*Macrosiphum euphorbiae*) was virtually nonexistent on Long Island, NEW YORK, and was of minor importance in commercial plantings in RHODE ISLAND. Populations in NEW JERSEY were heavy and injury moderate on tomatoes and potatoes early in the season, but numbers were very light on eggplants and peppers. Potato aphid was locally damaging on potatoes and tomatoes over most of MARYLAND. Throughout VIRGINIA high numbers infested tomatoes in June and July. Probably due to weather, no satisfactory controls were obtained. In FLORIDA as long as the spray schedule was followed, it caused no particular problem on springtime tomato transplants in Marion County. It was one of the most common vegetable pests in IOWA. In TEXAS it seriously damaged tomatoes in Bowie and Upshur Counties and was a major pest on potatoes in other areas. Populations ranged from light to moderate in potato-growing areas of COLORADO. Numbers in UTAH were unusually numerous in the spring on some Cache, Box Elder, and Salt Lake County potatoes. Potato aphid and FOXGLOVE APHID (*Acyrthosiphon solani*) were 2 of the 3 most prevalent species in CALIFORNIA. An unusually late spring in MAINE delayed migration of BUCKTHORN APHID (*Aphis nasturtii*), potato aphid, green peach aphid, and foxglove aphid to potatoes in Aroostook County. Early planted potatoes showed a 52 percent infestation which was unusually high for June 23-24; buckthorn aphid predominated. In early July green peach aphid increased its numbers and almost completed its spring migration. The other species also increased at this time. In mid-July foxglove aphid was found for the first time, and numbers per plant of buckthorn aphid were higher than those of potato aphid, although the latter species infested a slightly higher percentage of plants. By early September numbers decreased rapidly (40 percent decrease in one week) due to natural control agents and maturation of buckthorn aphid fall migrants. Aphid numbers at this time were below the threshold for feeding damage to reduce yields. Buckthorn aphid was dominant followed by green peach aphid and foxglove aphid; potato aphid had become scarce by this time.

LEAFHOPPERS were prevalent in most potato-growing areas of CALIFORNIA and a LEAFHOPPER (*Empoasca filamenta*) was generally light, but was occasionally numerous and caused foliage discoloration in UTAH. A WHITEFLY (*Aleyrodes spiraeoides*) was the dominant whitefly damaging peppers in a few locations in California.

LEAF MINER FLIES were very heavy late in the season on tomatoes in CALIFORNIA. Larvae of LEAF MINER FLIES (*Liriomyza* spp.) were more abundant and caused more damage to tomato transplants in mid-April than in recent years in Marion County, FLORIDA. VINEGAR FLIES (*Drosophila* spp.) were much higher in 1967 than in 1966. SEED-CORN MAGGOT (*Hylemya platura*) damaged tomatoes in hot beds in southeast ARKANSAS in early February. Abnormal larval numbers infested potato seed pieces in Adams County, WASHINGTON. PEPPER MAGGOT (*Zonosemata electa*) injury ranged moderate to severe during 1967 as in 1966 in NEW JERSEY. Extensive injury occurred in unsprayed plantings.

WESTERN FLOWER THRIPS (Frankliniella occidentalis) was unusually heavy and caused economic damage to some potato fields in Malhuer County, OREGON.

EUROPEAN EARWIG (Forficula auricularia) damaged tomato fruits and plants at Montpelier, VERMONT, and 1967 was the heaviest year for complaints throughout the State.

Populations and damage of SPIDER MITES were light to moderate on peppers, eggplants, tomatoes, and potatoes in 1967 in NEW JERSEY. A SPIDER MITE (Tetranychus marianae) infested commercial tomato and eggplant in two southern CALIFORNIA counties. Spread from the original infestation areas has not occurred. TWO-SPOTTED SPIDER MITE (T. urticae) was late and scattered in California, but was a problem in some areas on home garden tomatoes in KANSAS. TOMATO RUSSET MITE (Aculops lycopersici) was not the problem of 1966 in California. Damage was serious to tomato vines in commercial fields and home gardens in Dona Ana and Luna Counties, NEW MEXICO, due to the improper appraisal of the problem.

GARDEN SYMPHYLAN (Scutigerella immaculata) locally damaged tomato seedlings in CALIFORNIA. Garden symphylan generally was as damaging in 1967 as in 1966, especially to tomato, potato, eggplant, and pepper plantings. SLUGS destroyed thousands of dollars of ripe tomatoes in PENNSYLVANIA and damaged many other crops to a lesser degree as controls were ineffective.

BEANS AND PEAS

Highlights

CUTWORMS damaged large fields in San Juan County, Utah, while VARIEGATED CUTWORM caused severe damage to beans in Santa Barbara County, California. Both broods of EUROPEAN CORN BORER were much heavier than in many years in Pennsylvania. MEXICAN BEAN BEETLE caused serious damage to home gardens in Maryland and to pole and bush beans in Bernalillo and Sandoval Counties, New Mexico. COWPEA CURCULIO continued a major pest of commercial table peas in Alabama. COWPEA APHID was widespread and very heavy in home gardens and commercial plantings in Alabama and was considered the vector of cowpea mosaic in the State. BEAN APHID was widespread and very heavy in Kent and Sussex Counties in Delaware. LYGUS BUGS were widespread and very damaging in California. SEED-CORN MAGGOT caused damage to beans in Oregon and Maine.

CUTWORMS damaged large fields in the Blanding area of San Juan County and were common in home gardens in Salt Lake and Box Elder Counties, UTAH. Other CUTWORMS (Agrotis spp.) were light in OKLAHOMA and Prodenia spp. bored into beans and field peas at Belle Glade, FLORIDA, but were more numerous on spiny amaranth, a weed plant. BLACK CUTWORM (Agrotis ipsilon) and GRANULATE CUTWORM (Feltia subterranea) damaged beans where preplanting treatment was ineffective or not made in FLORIDA. Damage was heavy to mature beans on one farm due to many pods in contact with the ground. WESTERN BEAN CUTWORM (Loxagrotis albicosta) light trap catches in Jerome, Minidoka, and Twin Falls Counties, IDAHO, indicated moths were lighter in 1967 than in 1966 at all locations except Eden. Collections often exceeded 400 moths per night and larval damage, with few exceptions, was light to beans. VARIEGATED CUTWORM (Peridroma saucia) caused severe damage to beans in Santa Barbara County, CALIFORNIA.

BEET ARMYWORM (Spodoptera exigua) and FALL ARMYWORM (S. frugiperda) damaged bush, lima, and garbanzo beans in a few CALIFORNIA localities while WESTERN YELLOW-STRIPED ARMYWORM (Prodenia praefica) infested some beans throughout the State. Two or more generations of GREEN CLOVERWORM (Plathypena scabra) were abundant on lima beans throughout DELAWARE. Green cloverworm adult collections ranged light to moderate in blacklight traps during July and August over much of Lower MICHIGAN. Field problems did not develop because unfavorable weather and natural controls prevented larval buildup. Larvae of a NOCTUID MOTH (*Pseudoplusia includens*) and fewer larvae of *Trichoplusia ni* and *Autoplusia egena* heavily damaged beans late in the season in FLORIDA. ALFALFA LOOPER (*Autographa californica*) moths were taken in traps from May 27 onward and larvae infested peas in Skagit, Snohomish, and Whatcom Counties, WASHINGTON.

LESSER CORNSTALK BORER (*Elasmopalpus lignosellus*) was heavy on beans and field peas during the spring in the Belle Glade area, FLORIDA. One-quarter of an acre planting of field peas was infested in Santa Rosa County in early June. Lesser cornstalk borer was a serious pest on late plantings of table peas and beans in a few fields in Mobile, St. Clair, and other counties in ALABAMA. Both broods of EUROPEAN CORN BORER (*Ostrinia nubilalis*) were much heavier than in many years in PENNSYLVANIA and some beans were damaged. SALT-MARSH CATERPILLAR (*Estigmene acrea*) caused much damage to bean plantings in several CALIFORNIA locations.

MEXICAN BEAN BEETLE (*Epilachna varivestis*) was heavier than normal and caused much damage in numerous locations in MAINE. Infestations were especially heavy in Westbrook and Fryeburg. Infestations were generally light on commercial lima and snap bean plantings in DELAWARE, while during the summer Mexican bean beetle was above normal on snap and lima beans in most areas of MARYLAND. Damage was especially serious to home gardens. Populations were serious and damaging on lima and pole beans throughout ALABAMA and numbers were greater than in 1966. Field peas were less affected. Adult and larval feeding damage in MICHIGAN was light in commercial bean-producing areas this season. In NEBRASKA egg masses averaged 1 per 3 plants on field beans in the panhandle area in July. Populations were higher in 1967 than in 1966 due to fewer controls. Numbers were moderate on beans in some areas of COLORADO and required 1-2 control applications, while infestations were general on beans throughout central and northern UTAH where damage was common but normal. Damage was serious to pole and bush beans in Bernalillo and Sandoval Counties, NEW MEXICO. Defoliation was almost complete when controls were discontinued.

PALE-STRIPED FLEA BEETLE (*Systena blanda*) damaged lima beans in late June in one area of Sussex County, DELAWARE, and damaged field beans in Sheridan and Scotts Bluff Counties, NEBRASKA. BEAN LEAF BEETLE (*Cerotoma trifurcata*) was a pest of peas and beans in the 2 to 6-leaf stage in ALABAMA and was light throughout OKLAHOMA. WESTERN SPOTTED CUCUMBER BEETLE (*Diabrotica undecimpunctata undecimpunctata*) damaged vegetable crops in OREGON about June 1 and some pole bean fields were replanted due to seedling damage. SEED-CORN BEETLE (*Agonoderus lecontei*) was more of a problem to germinating beans due to cold, wet soil conditions in ILLINOIS. A WIREWORM (*Melanotus communis*) caused serious spotted damage on beans throughout the Everglades area of FLORIDA. COWPEA CURCULIO (*Chalcodermus aeneus*) was difficult to control on bush beans at Plant City in Hillsborough County, Florida, in late April and early May and caused light damage to snap beans and moderate damage to field peas at Belle Glade. Cowpea curculio continued a major pest to the increased acreages of commercial table peas in ALABAMA. Infestations in harvested peas were less in 1967 than in 1966 due to intensified control efforts.

PEA APHID (*Acyrthosiphon pisum*) was about normal in commercial plantings in DELAWARE, but nearly all plantings required treatment. Pea aphid was again below normal and well controlled on commercial plantings throughout MARYLAND. COWPEA APHID (*Aphis craccivora*) was widespread and very heavy in home gardens and commercial plantings in ALABAMA. This species was considered the vector of a widely distributed and damaging cowpea mosaic throughout the State. Cowpea aphid was light in OKLAHOMA, but was the most prevalent aphid on beans in CALIFORNIA. General infestations were apparent throughout the State.

GREEN PEACH APHID (*Myzus persicae*) was generally less abundant in 1967 in NEW JERSEY than in recent years, although numbers were moderate on beans throughout 1967. BEAN APHID (*Aphis fabae*) was very heavy and widespread in the lima bean areas of Kent and Sussex Counties, DELAWARE. Numbers were moderate and occasionally damaging to beans in UTAH.

LYGUS BUGS (Lygus spp.) were widespread and very damaging to beans in CALIFORNIA and TARNISHED PLANT BUG (Lygus lineolaris) was heavy and caused losses to snap and lima bean crops in Cape May County, NEW JERSEY.

SEED-CORN MAGGOT (Hylemya platura) was heavy in pole bean fields in Marion and Polk Counties, OREGON, with some replanting necessary. Seed-corn maggot damage on beans was above normal due to a late, stormy spring in UTAH. Populations presented a larger problem to germinating beans due to cold, wet soil conditions in ILLINOIS. Numbers and damage were heavy on beans in the South Portland area, MAINE, in late June. Other problem spots were noted, but were effectively controlled. LEAF MINER FLIES (Agromyza sp. and Liriomyza sp.) infested peas and beans in CALIFORNIA and required some controls.

THRIPS damaged some bean plantings in CALIFORNIA and BEAN THRIPS (Caliothrips fasciatus) infestations appeared normal on beans in UTAH.

SPIDER MITES (Tetranychus spp.) heavily damaged several commercial lima bean plantings on the Eastern Shore of MARYLAND while numbers and damage ranged light to moderate on beans in 1967 in NEW JERSEY. A SPIDER MITE (Tetranychus sp.) was common and often damaging on beans late in the season in UTAH and unspecified MITES were generally prevalent and damaging in CALIFORNIA.

SLUGS damaged snap and field beans more than usual in MICHIGAN during late June and early July, but plants outgrew the injury in many cases due to the high organic content in the fields.

COLE CROPS

Highlights

CABBAGE LOOPER caused extensive damage throughout New Jersey and seriously damaged cabbage in areas of Florida. DIAMONDBACK MOTH infestations were heavier in 1967 than during the past 15 years in western New York and were damaging to various crucifers in Florida. IMPORTED CABBAGEWORM was more numerous and destructive to cabbage and other cole crops in 1967 than in 1966 in Maryland and was a problem in all cabbage-growing areas of New Mexico. CABBAGE APHID was a serious pest of cabbage and collards throughout Alabama while unspecified APHIDS were heavy and damaging in the Zellwood muck area of Florida. CABBAGE MAGGOT damage was serious on cole crops in Maine, Rhode Island, New York, and California. FLEA BEETLES severely damaged radishes in Dane County, Wisconsin, and damaged many garden crops in all areas of the State.

CABBAGE LOOPER (Trichoplusia ni) caused extensive damage throughout NEW JERSEY and populations were difficult to control. Damage was similar to 1966 but occurred later in 1967. Damage did not increase to the formidable level normally expected on Long Island, NEW YORK, despite improperly applied controls. Approximately 50 eggs and larvae per untreated plant occurred during the peak infestation period in August and September compared with 100 or more in past seasons. In MARYLAND cabbage looper was generally below normal except for several heavy infestations on cabbage and broccoli during late August. Populations increased to very heavy levels on untreated cabbage at Hastings, FLORIDA, during March and April. Damage was serious on fall cabbage as warmer than usual temperatures made regular sprays necessary. At Sanford populations were similar to previous years with numbers peaking in October and from late February to late April. Cabbage looper reached 452 per 100 plants in April. Much economic loss occurred at Sanford during April as several fields were abandoned and others damaged. In early November populations were high on cabbage at Sanford, but by early December low levels of 10 per 100 plants were evident. Most commercial fields were free of problems. At Belle Glade, Florida, populations became serious on cabbage late and were very heavy by mid-May. Because of the high numbers, weekly control applications were inadequate and necessitated a 4-5 day treatment schedule. Cabbage looper almost destroyed untreated cabbage in the area. At Homestead numbers increased and then decreased slightly earlier than usual. Cabbage looper and larvae of a NOCTUID MOTH (Pseudoplusia includens) damaged cabbage, collards, and other cole crops throughout ALABAMA. Infestations were the heaviest ever observed on greens crops during the fall in ARKANSAS where controls were very ineffective. Cabbage looper ranged light to moderate on vegetables throughout TEXAS and the lower Rio Grande Valley and caused less damage than turnip aphid in OKLAHOMA. Cabbage looper adult flights were very late in MICHIGAN this season as general collections at blacklight traps began during the second week of September. Few specimens were taken at that time from traps in Berrien, Branch, Lenawee, and Monroe Counties. The larval problem was the lightest experienced since the survey program began in 1963 due to the late appearance of moths. Cabbage looper presented less of a problem than normal in 1967 because moth flights and egg laying were delayed by wet weather in ILLINOIS. Populations ranged moderate to heavy in home gardens and commercial plantings in Riley County, KANSAS, in July and August. Larvae and eggs were heavy on red cabbage in mid-October and on 80 acres of cauliflower in early November in Maricopa County, ARIZONA. Cabbage looper was a continuing problem on cole crops in 1967 in CALIFORNIA. Cabbage looper and ALFALFA LOOPER (Autographa californica) were very light and noneconomic in cabbage and broccoli fields in western OREGON. Alfalfa looper adults were taken in traps from May 27 onward and larvae infested broccoli in Skagit, Snohomish, and Whatcom Counties, WASHINGTON.

DIAMONDBACK MOTH (Plutella xylostella) larvae ranged moderate to severe on crucifers throughout the growing season in NEW JERSEY as numbers were slightly greater than in 1966. Diamondback moth appeared early in the season in Upstate NEW YORK and reached a high level in late-harvested cole crops. Infestations were heavier in 1967 than during the past 15 years in western New York. This increase is believed due in part to a change in the type of control. Diamondback moth larvae were abundant on wild crucifers in the Belle Glade area, FLORIDA, during winter, but caused no problems to commerical cole crops on a regular spray schedule. Larvae and adults were common on rape at Gainesville for several weeks in February and March. Larvae damaged a late cabbage setting at Sanford, and in early May increased to the highest level in 7 months. Larvae heavily infested and damaged a one-acre rutabaga field in Hillsborough County during January. In ALABAMA numbers were damaging in isolated areas on all cole crops, especially turnips and mustard. Low populations in 1967 followed a severe problem in 1966 in CALIFORNIA. The first IMPORTED CABBAGEWORM (Pieris rapae) of the season was found in Scarboro, MAINE, on June 22. There were no problems during the rest of the summer. Infestations ranged moderate to severe on crucifers throughout the growing season in NEW JERSEY as numbers were slightly greater than in 1966. Larvae were more numerous and destructive to cabbage and other cole crops than in 1966 in MARYLAND. This noctuid moth was one of the most destructive pests of commercial and home plantings of cabbage, collards, and other cole crops in ALABAMA. The first imported cabbageworm adult flight was noted on April 26 in Ingham and Washtenaw Counties, MICHIGAN, and for the second consecutive year a large flight of second-brood adults was widespread during early July. The usual large larval population infested cole crops, especially in home gardens with inadequate controls. Infestations were less of a problem than normal in 1967 as moth flights and egg laying were delayed by wet weather in ILLINOIS. Imported cabbageworm ranged moderate to heavy in home gardens and commercial plantings in Riley County, KANSAS, in July and August but caused less damage than turnip aphid in OKLAHOMA. This species presented a problem in all cabbage-growing areas of NEW MEXICO. Damage was general in UTAH and infestations were spotted in CALIFORNIA.

SOUTHERN CABBAGEWORM (Pieris protodice) damage was economic on a commercial planting in Riley County, KANSAS, in July, but this species and CROSS-STRIPED CABBAGEWORM (Evergestis rimosalis) caused less damage than turnip aphid in OKLAHOMA. E. rimosalis was severe on 5 acres of collards at Turkey Creek in Hillsborough County, FLORIDA, during January. CUTWORMS were more prevalent in 1967 and infested mustard and radish in a few locations in CALIFORNIA. Some cutworm damage occurred to cabbage fields in Salt Lake County, UTAH, during the spring.

CABBAGE APHID (*Brevicoryne brassicae*) increased to very high levels on untreated cabbage during March and April in the Hastings area, FLORIDA, and was a serious pest of cabbage and collards in all counties of ALABAMA. Cabbage aphid was economic in cabbage fields in NEW MEXICO but easily controlled where treatments were properly applied. Infestations were generally numerous in UTAH. TURNIP APHID (*Hyadaphis pseudobrassicae*) damage occurred on turnips and mustard throughout the summer and winter in ALABAMA. Turnip aphid was heavy, 300-500 per leaf, in home garden and commercial turnips in Tulsa County, OKLAHOMA, during mid-November and was unusually abundant on wild crucifers in May in Yakima County, WASHINGTON. GREEN PEACH APHID (*Myzus persicae*) severely infested an acre of rutabagas in Hillsborough County, FLORIDA, during January. Numbers were common on rape at Gainesville and were very high on untreated cabbage at Sanford in early January. Green peach aphid comprised 80 percent and cabbage aphid comprised 20 percent of the Sanford infestation of over 500 aphids per plant on numerous cabbages about to develop heads. Commercial fields on a spray schedule were free of aphids. Green peach aphid and cabbage aphid were the 2 important aphids in CALIFORNIA, while these 2 species plus HARLEQUIN BUG (*Murgantia histrionica*) damaged some rape locally near Levelland in Hockley County, TEXAS. Unspecified APHIDS were heavy on greens in the muck area at Zellwood, FLORIDA, during November and early December with some fields a complete loss. This may have been due to a combination of heavy aphid populations and less than 0.50 inch of rain during November. Aphids were also generally serious on cole crops in CALIFORNIA throughout 1967.

CABBAGE MAGGOT (*Hylemya brassicae*) damage was serious in some commercial fields in southern MAINE and one field required replanting by late June. Several cole crops were severely damaged in the Belmont area at this time. Cabbage maggot was probably the most serious pest of truck crops in RHODE ISLAND as serious damage occurred on commercial rutabagas. Populations caused very light damage in all areas of NEW JERSEY during 1967. Cabbage maggot was destructive until mid-June on Long Island, NEW YORK. Damage was severe to seedlings that were untreated or ineffectively treated. Some late season damage also occurred in many areas on turnips and rutabagas. Numbers were heavy in New York and infestations in field-set cole crops averaged about 100 percent. These infestations were reduced for plants set June 15-25, but earlier and later plants were heavily infested. The wet season prevented much of the loss that would have occurred, and despite the heavy infestation, only a few instances of damage were due to cabbage maggot. Infestations were spotty in radish plantings and ranged from very heavy in Monroe County to very light in Erie County. This species was resistant to chlorinated hydrocarbons in the cole-crop producing areas. Cabbage maggot was widespread with heavy local damage in CALIFORNIA.

FLEA BEETLES severely damaged radishes in Dane County, WISCONSIN, in early June. A few weeks later populations became heavy and damaged many garden crops in all areas of the State. Much damage occurred in cabbage seed beds and on home-grown cabbage in Columbia County. WESTERN SPOTTED CUCUMBER BEETLE (*Diabrotica undecimpunctata undecimpunctata*) damaged vegetable crops in OREGON about June 1 and some broccoli fields were replanted due to seedling damage. YELLOW-MARGINED LEAF BEETLE (*Microtheca ochroloma*) was a serious pest in Mobile and Baldwin Counties along the gulf coast of ALABAMA. CABBAGE SEEDPOD WEEVIL (*Ceutorhynchus assimilis*) caused damage in a few locations in CALIFORNIA while adults infested wild mustard blossoms in Skagit County, WASHINGTON, in May. VEGETABLE WEEVIL (*Listroderes costirostris obliquus*) caused local damage in Santa Barbara County, CALIFORNIA, and severely infested a mustard planting at Winter Garden, FLORIDA, in January.

HARLEQUIN BUG (*Murgantia histrionica*) was not as serious as it was several years ago in ALABAMA due probably to development of parasites. A LYGUS BUG (*Lygus* sp.) was numerous on blooming wild mustard in Benton County, WASHINGTON, in April.

CUCURBITS

Highlights:

MELON APHID caused much damage to cucurbits in Utah and California and necessitated control treatments to watermelons and cantaloups in Yuma County, Arizona. STRIPED CUCUMBER BEETLE caused damage to cantaloup and watermelon in Delaware and were heavy on the lower Eastern Shore of Maryland. SQUASH BEETLE and SQUASH BUG heavily infested squash in San Joaquin County, California. Larvae of a PYRAUSTID MOTH were severe on squash at Hialeah, Florida, while SPIDER MITES caused serious damage to watermelons and cucumbers on the Eastern Shore of Maryland.

MELON APHID (Aphis gossypii) was general and heavier on cucurbits than in 1966 in MARYLAND but was noneconomic. Numbers were moderate to heavy in south-central, west-central, and southwest OKLAHOMA from mid-July to early August. This aphid caused much damage in some home squash plantings in Davis, Salt Lake, Utah, and Weber Counties, UTAH. In ARIZONA controls were applied regularly to watermelons and cantaloups in April and May in Yuma County due to heavy populations. In general melon aphid caused much damage locally to melon, cucumber, and squash plantings in CALIFORNIA.

STRIPED CUCUMBER BEETLE (Acalymma vittatum) numbers and damage were moderate on squash in Cedar Grove in mid-June and ranged light to moderate in Westbrook, MAINE, by late June. The latter infestation apparently was caused by migrating adults. Infestations remained unchanged in RHODE ISLAND, but larval damage was severe to cantaloups and watermelons touching the ground in southwestern Sussex County, DELAWARE. In MARYLAND newly emerged adults were heavy on young squash and cucumber plantings on the lower Eastern Shore. Striped cucumber beetle was feeding on blossoms of vine crops in August in ILLINOIS, although very little activity was apparent before August. This species was the most serious pest of commercial and home-grown cucumbers throughout ALABAMA but much less important than in most years. SPOTTED CUCUMBER BEETLE (Diabrotica undecimpunctata howardi) caused less damage than in 1966 in NEW JERSEY and was not a major pest in ALABAMA as only isolated damage occurred. Spotted cucumber beetle was active on cucumber and other vine crops in OKLAHOMA during the summer and a CUCUMBER BEETLE (Diabrotica sp.) damaged some melons in CALIFORNIA. SQUASH BEETLE (Epilachna borealis) remained unchanged in RHODE ISLAND but heavily infested squash in San Joaquin County, California.

SQUASH BUG (Anasa tristis) damaged pumpkin, squash, and other vine crops in southeast, south-central, north-central, east-central, west-central, and northwest OKLAHOMA. Populations increased in late May and continued to mid-September. Squash bug caused normal damage in UTAH, but heavily infested squash in San Joaquin County, CALIFORNIA. In DELAWARE, GARDEN FLEAHOPPER (Halticus bracteatus) was heavy and damaged much watermelon foliage in a Sussex County field.

Larvae of a PYRAUSTID MOTH (Diaphania sp.) were severe on Chinese squash at Hialeah, FLORIDA, during late September and early October. SQUASH VINE BORER (Melittia cucurbitae) was a pest on cucumbers and cantaloups in central and southern ALABAMA and was spotty on cucurbits in RHODE ISLAND. CABBAGE LOOPER (Trichoplusia ni) damaged some melon plantings in CALIFORNIA.

SEED-CORN MAGGOT (Hylemya platura) caused local damage to cucumbers in Fresno County and THRIPS caused much damage to cucumbers in San Diego County, CALIFORNIA.

SPIDER MITES (Tetranychus spp.) were heavy and caused serious damage to many watermelon and some cucumber plantings on the Eastern Shore of MARYLAND in late July and August. MITES were generally damaging late in the season in CALIFORNIA as an unusually late season prolonged harvest. GARDEN SYMPHYLAN (Scutigerella immaculata) damaged some squash early in the season in the same State.

GENERAL VEGETABLES

Highlights:

CABBAGE LOOPER was widespread and damaging on some crops in California and was very heavy on lettuce in the Mesilla Valley, New Mexico. Cabbage looper became serious late in the season at Belle Glade, Florida, and was very heavy on celery by mid-May. WESTERN YELLOW-STRIPED ARMYWORM caused much damage to vegetables throughout California. CUTWORMS were the number one problem to commercial and home plantings in Maine and were a continuing problem on many vegetable crops in California. ARTICHOKE PLUME MOTH was very severe in Santa Barbara, San Mateo, and Mendocino Counties of California and caused losses to experimental artichokes in Oregon. APHIDS were heavier than normal in Arkansas. ASPARAGUS BEETLE and SPOTTED ASPARAGUS BEETLE were more abundant than in 1966 in New Jersey. FOUR-LINED PLANT BUG caused much heavier damage than in recent years in Lower Michigan. SPINACH LEAF MINER was very troublesome on spinach and Swiss chard in most areas of Maine. MITES were generally very damaging to onions in California and SLUGS were probably one of the most common problems in home gardens and flower plantings in Maine.

CABBAGE LOOPER (Trichoplusia ni) was widespread and damaging to some crops throughout 1967 in CALIFORNIA. In ARIZONA infestations were light from January through June and ranged moderate to heavy on vegetables, especially lettuce, from September to November in Yuma and Maricopa Counties. Populations were heavy and required a 3-day treatment schedule on lettuce during the growing season in the Mesilla Valley, NEW MEXICO. Cabbage looper became serious late at Belle Glade, FLORIDA, although was very heavy by mid-May on celery. ALFALFA LOOPER (Autographa californica) was severe on lettuce in Monterey County, CALIFORNIA, while BEET ARMYWORM (Spodoptera exigua) caused local damage to many crops in the State. WESTERN YELLOW-STRIPED ARMYWORM (Prodenia praefica) caused much damage to many vegetables throughout California. GREEN CLOVERWORM (Plathypena scabra) was light on spinach in Zavala County, TEXAS.

CUTWORMS were the number one problem to commercial and home plantings in MAINE in 1967 as much damage occurred in many areas. In UTAH damage was common in gardens in many areas with especially serious occurrences in the Price and Wellington area of Carbon County, the Miller Creek area of Carbon and Emery Counties, and in San Juan County gardens. Cutworms were a continuing problem on many vegetable crops in CALIFORNIA. In western OREGON, VARIEGATED CUTWORM (Peridroma saucia) was generally noneconomic as only light damage occurred in some home gardens until late August. Variegated cutworm and BLACK CUTWORM (Agrotis ipsilon) caused less damage in 1967 to asparagus and sweetpotatoes than in 1966 in NEW JERSEY. Moth flights generally were abundant during summer; however, the wet season provided hosts other than vegetables.

SALT-MARSH CATERPILLAR (Estigmene acrea) necessitated the erection of aluminum barrier strips around many lettuce and vegetable fields during late September and early October in Maricopa, Pinal, and Yuma Counties, ARIZONA. ARTICHOKE PLUME MOTH (Platyptilia carduidactyla) was very severe in Santa Barbara, San Mateo, and Mendocino Counties, CALIFORNIA, and caused losses of 10-15 percent in trial plantings of artichokes in OREGON. IMPORTED CABBAGEWORM (Pieris rapae) was severe in home gardens in VERMONT.

GREEN PEACH APHID (Myzus persicae) was generally less abundant in 1967 throughout NEW JERSEY than in recent years. Infestations were moderate on lettuce throughout the season. Numbers were unusually light on commercial spinach plantings on the Eastern Shore of MARYLAND. In VIRGINIA infestations were especially troublesome on spring spinach. The situation worsened due to the development of an Empusa type fungus which made the removal of the fungus-killed aphids by washing impossible. Populations were light on spinach in Zavala County, TEXAS, and ranged moderate to heavy on vegetables in Maricopa and Yuma Counties, ARIZONA, from February to early May. Controls were required in many fields. Unspecified

APHIDS were general in all CALIFORNIA areas with continued controls required, and were heavier than normal throughout 1967 in ARKANSAS due to cool, damp weather. POTATO APHID (Macrosiphum euphorbiae), BEAN APHID (Aphis fabae) and green peach aphid were the 3 dominant aphids in CALIFORNIA. Two other APHIDS (Anuraphis middletonii and Brachycaudus cardui) caused damage to trial plantings of artichokes during early June in Coos County, OREGON, and alates of another APHID (Cavariella aegopodii) were in flight in mid-May in Yakima County, WASHINGTON. TURNIP APHID (Hyadaphis pseudobrassicae) was very severe in some home gardens in Salt Lake, Weber, and Davis Counties, UTAH, in the spring.

ASPARAGUS BEETLE (Crioceris asparagi) was more prevalent as damage was evident on plants in VERMONT. Feeding damage and egg laying on asparagus stalks was about normal in DELAWARE as most plantings required at least one treatment. Asparagus beetle and SPOTTED ASPARAGUS BEETLE (C. duodecimpunctata) were more abundant in 1967 than in 1966 in NEW JERSEY. Damage was light during harvest, but late-summer infestations caused noticeable damage to ferns in several Gloucester County fields. In CALIFORNIA asparagus beetle was a pest on asparagus from March to July in Orange County, and another LEAF BEETLE (Trirhabda geminata) infested carrot plantings in San Luis Obispo County. Spotted asparagus beetle and asparagus beetle remained unchanged in RHODE ISLAND. Spotted asparagus beetle feeding damaged asparagus spears in some areas of DELAWARE and injured asparagus at Finley, NORTH DAKOTA. C. duodecimpunctata adults infested volunteer asparagus in May in Benton County, WASHINGTON. Crioceris spp. were generally light on commercial acreages in Cecil and Kent Counties, MARYLAND.

TORTOISE BEETLES were heavy on sweetpotatoes from mid-August to mid-September in OKLAHOMA. Metriona bicolor and Agroiconota bivittata were prominent in the north-central area while Jonthonota nigripes and Deloyala guttata were the most important species in the south-central area. POTATO FLEA BEETLE (Epitrix cucumeris) infestations and damage ranged light to moderate on Swiss chard in MAINE. SWEETPOTATO FLEA BEETLE (Chaetocnema confinis) adults ranged 2-10 per plant on newly set sweetpotatoes in Wicomico County, MARYLAND, and larval damage to roots was below normal. In NEW JERSEY, SPOTTED CUCUMBER BEETLE (Diabrotica undecimpunctata howardi) caused slightly less damage in 1967 than in 1966. ASIATIC GARDEN BEETLE (Maladera castanea) adults heavily damaged a large planting of carrots at Salisbury, MARYLAND, during early July.

TARNISHED PLANT BUG (Lygus lineolaris) damage ranged moderate to severe on celery plantings in Warren County, NEW JERSEY, during midsummer. Damage was more extensive in 1967 than in 1966 in the State. LYGUS BUGS (Lygus spp.) were very serious on many vegetables in CALIFORNIA and HARLEQUIN BUG (Murgantia histrionica) damaged home gardens in Riley County, KANSAS, in July. FOUR-LINED PLANT BUG (Poecilocapsus lineatus) adults and nymphs were very numerous during mid-June in many areas of Lower MICHIGAN and populations continued high from late June through July. Feeding damage was much heavier than during recent years with a wide variety of broadleaf plants including vegetables, field crops, weeds, ornamental shrubs, and flowers being infested.

SPINACH LEAF MINER (Pegomya hyoscyami) was very troublesome on spinach and Swiss chard in most areas of MAINE with commercial and home plantings infested. In MONTANA spinach leaf miner was a problem in vegetable gardens. Damage was common on table beets in UTAH and eggs were first reported on spinach during May in Yakima County, WASHINGTON. ONION MAGGOT (Hylemya antiqua) caused damage to seedling onions on June 6 in untreated plots at Lake Labish in Marion County, OREGON, and caused very light damage in all areas of NEW JERSEY during 1967. ANTHOMYIID FLIES were common on onions and vegetables in MICHIGAN in mid-May, but controls were generally very effective.

ONION THRIPS (Thrips tabaci) adults and nymphs infested fall and spring planted bulb and seed onion to seed fields in the Caldwell and Nampa areas, IDAHO, on May 12. Infestations were prevalent in bulb fields during late July. Numbers ranged light to heavy in COLORADO, but controls kept losses to a minimum. Onion thrips was common in UTAH and caused generally moderate to severe discoloration of onions. This species was very light and noneconomic on asparagus and onions throughout NEW JERSEY.

FIELD CRICKETS (*Gryllus* spp.) damaged vegetables in Imperial County, CALIFORNIA, while EUROPEAN EARWIG (*Forficula auricularia*) was a severe garden pest in the State.

MITES were generally very damaging to onions in many CALIFORNIA locations. BROWN WHEAT MITE (*Petrobia latens*) caused serious damage to onions in Modoc County and BULB MITE (*Rhizoglyphus echinopus*) heavily damaged onions in Imperial County, while a SPIDER MITE (*Aplonobia myops*) was general on asparagus in Orange County, California. TWO-SPOTTED SPIDER MITE (*Tetranychus urticae*) damaged vegetables especially in central and eastern WASHINGTON, and webbed carrot umbels in large areas of a seed field near Weiser, IDAHO.

SLUGS were as usual very troublesome in numerous localities of MAINE and were apparently one of the most common problems in home gardens and flower plantings. TAWNY GARDEN SLUG (*Limax flavus*) was found for the first time in OREGON where it fed on garden vegetables in Jackson County. A SYMPHYLAN ranged moderate to heavy and caused heavy damage to some home gardens in Washoe County, NEVADA, in late June and July. GARDEN SYMPHYLAN (*Scutigerella immaculata*) damage was light for the third consecutive year on vegetables in southwestern WASHINGTON. Garden symphylan was generally as damaging as in 1966, especially to asparagus, and CENTIPEDES were generally more damaging throughout NEW JERSEY.

The Geographic Distribution of the Brown Recluse Spider, *Loxosceles reclusa* (Araneae, Scytodidae) and Related Species in the United States

J. Richard Gorham*

Since 1872 in North America and since 1873 in South America, physicians have recognized a peculiar necrotic skin lesion that is now referred to as "necrotic arachnidism." The causative agent in South America was discovered to be *Loxosceles laeta* in 1934 (1). In 1957, *L. reclusa* was incriminated as the causative agent of necrotic arachnidism in North America (2). Since that time, the brown recluse spider has been the object of considerable interest and study in the United States.

The significance of a spider bite case report published in 1929 in the Journal of the American Medical Association was apparently unappreciated by scientists in both the Americas. Dr. L. F. Schmaus, a Kansas physician, described a rather mild case of necrotic arachnidism in which the offending spider was recovered and identified as a member of the genus *Loxosceles* (3).

The taxonomy of the genus *Loxosceles* was the subject of two monographs by Dr. W. J. Gertsch, one for the North American forms (4), and one for the South American forms (5). A major biological study of the brown recluse spider was recently completed by Dr. Maxine Hite and colleagues (6), working at the University of Arkansas.

Since the syndrome called necrotic arachnidism (=loxoscelism) has come into the medical literature in North America, there has been a rash of reported cases of necrotic spider bite. Most of these reports have been based solely on clinical and pathological observations made on the patients. Only relatively few of these clinical diagnoses have been supported by specimens of brown recluse spiders definitely associated with the cases.

Fortunately, necrotic arachnidism is an extremely rare disease. Unfortunately, it may be a very serious disease (7). At least two fatal cases involving *L. reclusa* have been reported (8). A specific antivenin has been developed in South America, but it is not available in the United States. Dillaha and associates (9) have had good results with a course of treatment employing certain corticosteroids.

In view of the widespread interest in the brown recluse spider and the many reported cases of necrotic arachnidism, the primary purpose of this note is to delineate, as accurately as present information will permit, the geographic distribution of the various members of the genus *Loxosceles* in the United States. The accompanying map, Figure 1, is based upon data from previous issues of the U.S. Department of Agriculture Cooperative Economic Insect Report, from published monographs and papers, and from personal communications with numerous interested scientists, whose help is gratefully acknowledged.

The brown recluse spider, *L. reclusa*, seems to be most common in Missouri, Arkansas, and eastern Kansas, according to Dr. Curtis Wingo (10) of the University of Missouri. There is much less certainty about the peripheral limits of its distribution. On the north and east, no specimens of *L. reclusa* have been found in Iowa, Ohio, Pennsylvania, Maryland, Virginia, West Virginia, North Carolina,

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South Carolina, and Florida, in spite of much discussion in the news media of necrotic spider bite. On the north and west, virtually all of Nebraska, the northernmost counties of Missouri, Colorado, and New Mexico are presently negative. With a few exceptions, all confirmed cases of necrotic arachnidism have occurred within the presently known range of L. reclusa.

There is every reason to believe that the presently known range will be enlarged because (1) people are actively searching for the spider in places where it has covertly existed all along, and (2) people are taking it with them as they move about the country. That this spider is amenable to having its range extended through human activity is demonstrated by its recovery from a furniture shipment in Albany County, Wyoming (11), and from packing-crate lumber in Los Angeles County, California (12). Its arrival in Tucson, Arizona, probably came about in the same way, but this cannot be said with certainty (13). The brown recluse spider can live both indoors and outdoors; in Texas it is found out-of-doors, but in Missouri it prefers houses. Both habitats must therefore be searched.

The notorious South American spider, L. laeta (14), at some unknown time in the past, inadvertently was imported into the United States. It took up residence in the basement of the Museum of Comparative Zoology at Harvard University in Cambridge, Massachusetts (15).

L. rufescens, which occurs in widely scattered places around the world (4, 5), has been taken over the years in a few places in the United States (Figure 1). The only collections in recent years have been made in Galveston, Texas, and Tifton, Georgia, but this species may be present in undiscovered foci.

The cytotoxic nature of the venom of L. rufescens has been demonstrated with experimental animals (16). Of the several native forms of Loxosceles, the ranges (4, 17) of which are shown in Figure 1, only L. unicolor (18) and L. reclusa have been implicated in cases of necrotic arachnidism. In regard to their danger to man, all the members of the genus Loxosceles must be considered "guilty until proved innocent."

The characteristics for recognition of L. reclusa, L. rufescens, and L. laeta may be simply stated: they are all small brown spiders, slightly less or slightly greater than 1/2 inch in length, with a darker brown fiddle-shaped marking on the carapace, and six eyes in three pairs, as in Figure 2. However, to differentiate between these three species, or for that matter, between any members of the genus requires the best efforts of a taxonomic specialist with experience in this group of spiders. Great caution should be exercised in assigning specific names to specimens taken in those areas where overlapping of geographic ranges occurs. L. unicolor lacks the fiddle-shaped marking, but the number and arrangement of the eyes are the same as in the other species.

Only L. reclusa, the brown recluse spider, has an accepted common name in English. Very little is known about the other members of the genus Loxosceles in the United States (4). They are referred to simply as "brown spiders." The name "fiddleback spider" is descriptive of L. laeta, L. reclusa, and L. rufescens (Figure 2).

Anyone with reliable information about the geographic distribution of Loxosceles spiders or about confirmed cases of necrotic arachnidism is invited to submit such data to the Cooperative Economic Insect Report or to the author at the National Communicable Disease Center, Atlanta, Georgia 30333.

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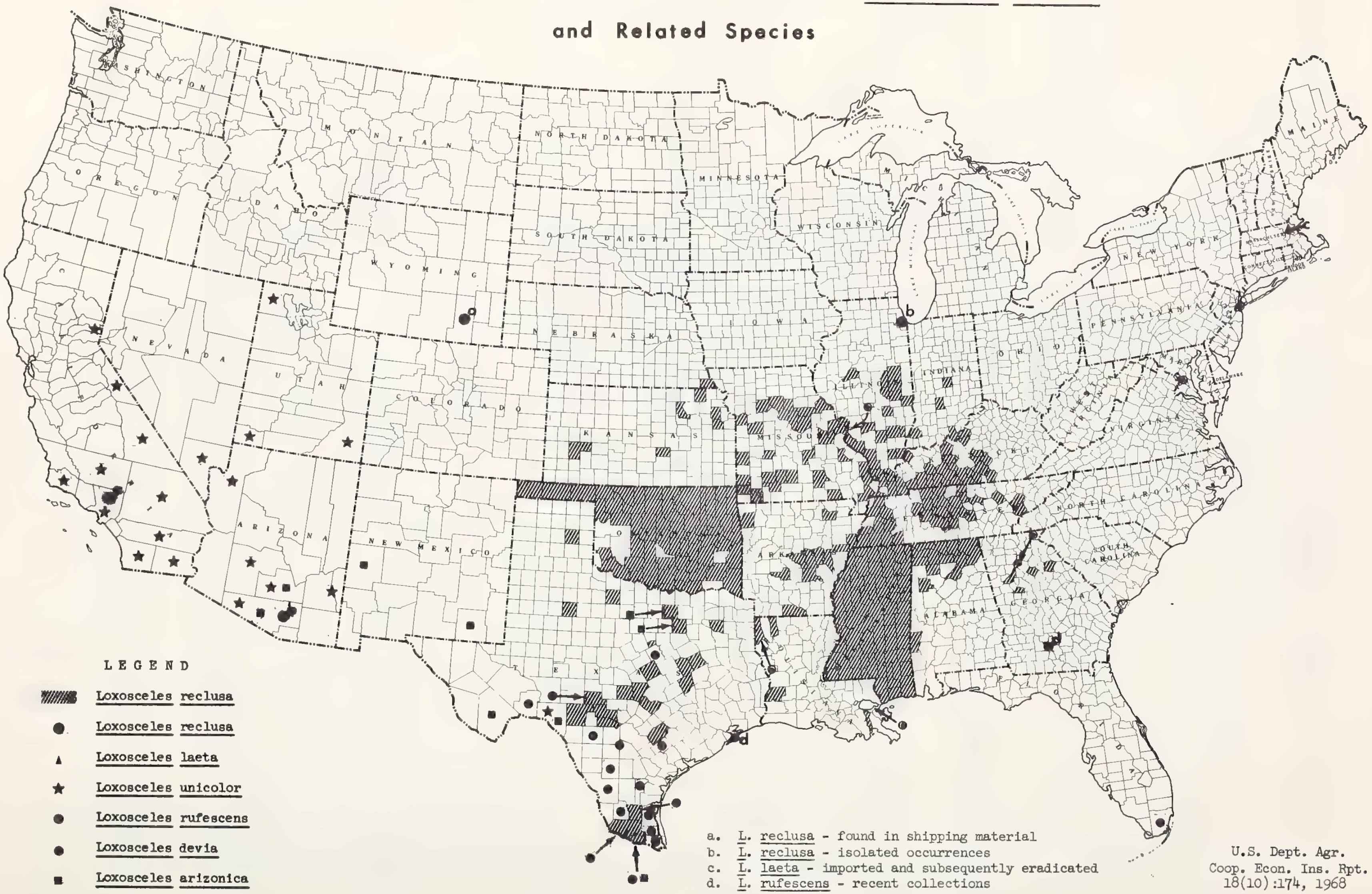
Figure 1. Distribution of Brown Recluse Spider (*Loxosceles reclusa*) and Related Species



a. *L. reclusa* - found in shipping material
b. *L. reclusa* - isolated occurrences
c. *L. laeta* - imported and subsequently eradicated
d. *L. rufescens* - recent collections

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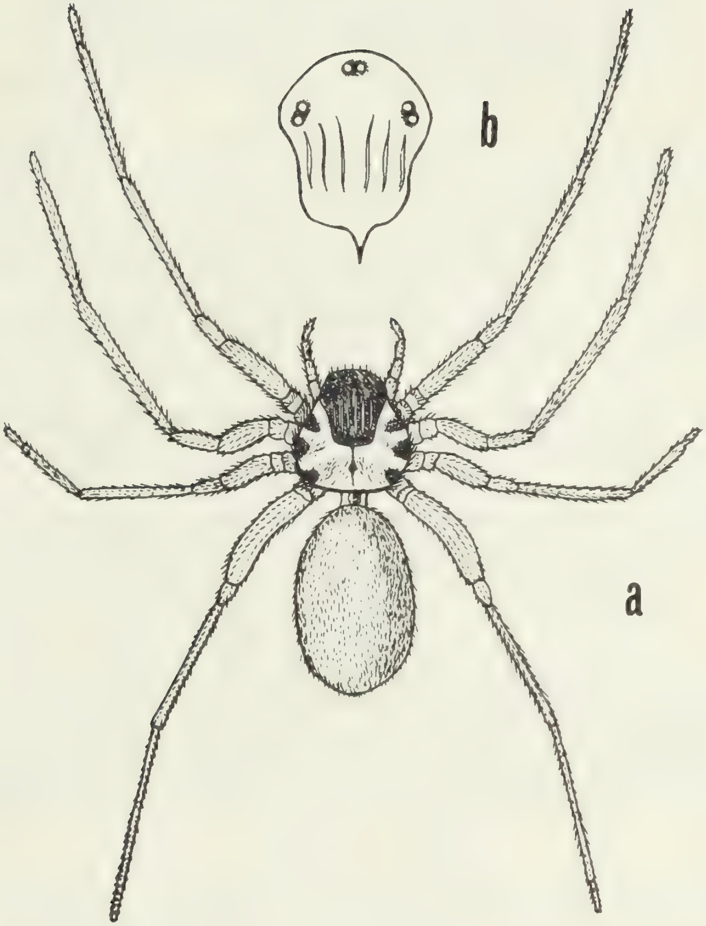

Figure 2.

a. Generalized features of *L. reclusa*, *L. rufescens*, and *L. laeta*

b. Detail of fiddle-shaped area of carapace showing six eyes in three diads

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Measuring Insect Infestations

You are aware of the increasing need for more adequate means for measuring insect populations. As you know, survey methods are available for about 80 pests. Limitations of some of these methods are recognized, but they do give a common language. What can be done about the many economic species for which survey methods have not been developed? With a little effort, we believe a lot can be done by simply making counts or numerical estimates if actual measurement is not possible or practical.

A review of the "Cooperative Economic Insect Report" will show that much survey information is reported in indefinite terms: Heavy, light, medium, moderate, rather heavy, considerable, troublesome, etc. It would seem that many of these abstract evaluations could be stated in definite terms such as insects per square foot, per square yard, per sweep, per plant, per animal. There is also a great need for more concrete information on insect damage. Compare the following reports on the same condition: "Approximately 40 percent defoliation in a 100-acre grove." "Heavy defoliation in one large grove."

The use of more numerical evaluations in insect survey would greatly improve communications between entomologists and others interested in survey results. Such evaluations would also make the data much more useful for records purposes.

We ask your help in improving the quality of reports on insect populations and their damage. We are aware that only through more research can we have better methodology in measuring insect populations and damage. Adequate research in this area is not likely to be forthcoming in the foreseeable future, however. In the meantime, we believe there are some constructive steps that can be taken to improve the existing situation.

The guidelines on the next page are offered as a reference for reporting insect conditions. If you have other suggestions, please send them to the address shown on the inside front cover of CEIR. They will be appreciated. (J. W. Gentry).

Preparation of Notes for Cooperative Economic Insect Report

Requests have been received relative to the type of information desired for the Cooperative Economic Insect Report and suggestions made for revision in the format.

The report will be reorganized on a principal crop basis. This will simplify present format and make the material more accessible and useful. It is hoped this approach will also stimulate greater participation by pointing out lack of reporting on individual crop problems. Efforts will be made to evaluate and present the information in ways to make it more useful in insect control.

Forecasting statements will be developed wherever field reports support such action. Reporters are encouraged to include this vitally important information in their notes. Emphasis of the Cooperative Economic Insect Report will be on the important insect problems of a regional nature, notes on routine insect occurrence will be kept to a minimum. Routine notes submitted on common insects will be added to the National insect files as warranted, however.

The following guidelines are suggested for preparation of notes. It is realized that all of the information outlined will not be available in each situation, but give the following information when possible.

1. Common (if available) and scientific name of species involved. Stages of insect involved. (If a taxonomic problem exists, it should be noted).
2. Location (definite, recognized area within state, such as region, county or town), date, name of observer or reporter. If note is for period other than current reporting period, give date of observation.
3. Host involved, scope and extent of infestation in number of counties, acres, trees, animals, etc. Also stage of host.
4. Quantitative evaluation of infestation according to recognized survey methods. Where such methods are not available, give numerical data such as number per linear foot, per plant, per sweep or per animal. These data should be based on a representative sampling. An adjectival rating should be accompanied by a numerical rating.
5. Estimation of extent of injury or damage.
6. Comparisons with previous infestations, outlook or predictions for future infestations, unusual influences.
7. Status of natural or applied control.
8. When reporting new State, United States, or North America records, include the above information insofar as applicable, as well as name of taxonomist making determination.

Examples of notes including these data are as follows:

EUROPEAN RED MITE (Panonychus ulmi) - Egg populations have reached point where protective sprays are warranted in 10 percent of apple orchards in Knox County. Counts on June 30 showed 0 to 4.8 live mites per leaf and 0 to 37.6 eggs per leaf. Further increase and spread expected with continued favorable weather. (Jackson, July 2).

EUROPEAN CORN BORER (Ostrinia nubilalis) - Oviposition and hatch practically complete in central counties. Fifty egg masses per 100 stalks in northwest area. In southern counties, all corn 35 inches or taller, 70 to 100 percent infested with 2 to 22 larvae per stalk. Larvae from first to third instar. (Smith).

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